Incorporating Feedback into the Military Decision Making Process to Improve Decision Making Performance.

A Monograph
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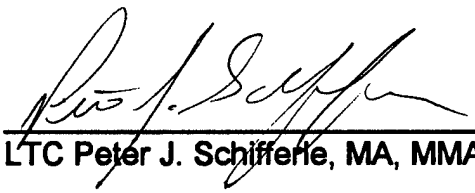

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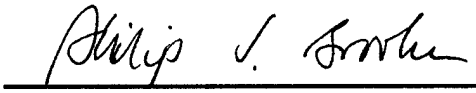

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ABSTRACT

INCORPORATING FEEDBACK INTO THE MILITARY DECISION MAKING PROCESS TO IMPROVE DECISION MAKING PERFORMANCE by MAJ Kenneth R. Smith, USA, 40 pages.

Tactical problems that confront commanders are filled with uncertainty and ambiguity. The complexities of the tactical environment combined with man's cognitive limitations can cause intendedly rational individuals to make decisions which are not totally rational. Many initiatives look to technology to simplify the complexities of this decision making environment. This monograph examines recent theories from decision making and judgement research to identify means to improve the human aspects of decision making in staffs.

A recent theory for managing and improving decision accuracy in staffs is presented along with a feedback intervention theory. Negative trends, reported by the Center for Army Lessons Learned, are analyzed with respect to these theories to illustrate which core constructs negatively influence decision making accuracy. A feedback intervention, in the form of a modified after action review—modified because it is more prescriptive and less focussed on discovery learning— is recommended as a formal change to the military decision making process to overcome these negative trends and improve decision making accuracy.

Contents

INTRODUCTION

> Moreover, we must always remember the human dimension of battle. Battle results are final. When it's over, it's over, and the memories are frozen in time. We are talking about commanding soldiers in the tough, unforgiving arena that is land battle. We must adopt changes when those changes get results better than we do now.
>
> General Frederick M. Franks Jr., U.S. Army, Retired,
> *Battle Command: A Commander's Perspective*

Commanders face a complex environment of imperfect knowledge, uncertainty, and ambiguity. The problems they must solve are complex, and the price of failure can be expensive in both lives and material resources. Yet, there is an extensive amount of literature highlighting the cognitive limitations of people. James March, Jack Steele Parker Professor of International Management and Professor of Political Science and Sociology at Stanford University, characterizes these limitations as limitations in memory, attention, comprehension and communication.[1] Addressing the problems of comprehension, they have difficulty organizing and analyzing information to form inferences about the causal connections of the relevant features of their environment. In their desire to be rational and to overcome these limitations, commanders employ staffs to assist in solving their tactical problems on the battlefield. Much attention has recently been focussed on the application of information age technologies to reduce this complexity and improve the quality of

decisions commanders make. But, has the army fully developed the human aspects of decision making? With the Military Decision Making Process having undergone very little substantive changes in recent years, the question this paper exams is: should the U.S. Army modify the military decision making process (MDMP) to improve decision making quality? Specifically, should the MDMP be modified to include a feedback intervention, resembling a mini after action review (AAR) following the final step of the MDMP—orders production?

> "The difficulties attendant to decision making are usually blamed on the inadequacy of available information, and, therefore, our technological expertise has been mobilized to remedy this problem. Devices proliferate to supply the professional decision maker with an abundance of data. However, the problem of interpreting and integrating this information has received surprisingly little attention. At this point, the decision maker is typically left to his own devices. More likely than not he will proceed in much the same manner that has been relied upon since antiquity."[2]

The above quotation is not recent. It appeared over a quarter of a century ago, before the age of personal computers and handheld calculators, yet it is just as relevant today as it was in 1971 when it was first published. Many applications of technology increase the quality and quantity of information with intentions of improving decision making accuracy. Networking technologies allow electronic communications across tactical networks and across continents. Yet, research is finding that increasing the quantity and quality of information decreases accuracy in predictive judgements.[3] Electronic media in group decision making settings inhibits the sharing of unique information necessary for accurate decisions.[4] Perhaps the solution for improving decision making in army staffs is already accepted, yet not applied as a part of our decision making process.

This monograph follows the development of a recent theory for decision making developed by John R. Hollenbeck, and his colleagues from Michigan State University, that identifies and explains essential elements of staff decision making referred to as core constructs. Chapter two relates the development of the theory and applies this theory to the MDMP—identifying the theory's core constructs within the steps of the MDMP. Chapter three combines a feedback intervention theory, the U.S. Army's doctrinal training concept of after action reviews (AARs), with a theory linking task characteristics to expert competency to develop an appropriate structure for the proposed feedback intervention.

The Center for Army Lessons Learned (CALL) publishes trends from the combat training centers (CTCs). The paper examines and analyzes negative trends published by CALL for the National Training Center (NTC) and Joint Readiness Training Center (JRTC). The selected trends have been analyzed to determine which core constructs are having the greatest impact on the observations. If the deficiencies are occurring within the core constructs of decision informity, team informity, dyadic sensitivity, or hierarchical sensitivity—which, in accordance with Hollenbeck et al.'s theory, is where feedback would have a direct impact on decision making accuracy—then the monograph suggests that the MDMP should be modified to include a modified AAR as a part of the process.

The paper shows that many of the difficulties encountered by staffs at battalion and brigade level can be greatly influenced in a positive manner if feedback were formalized into the MDMP by including a modified AAR following

orders production. Chapter four recommends how the AAR should be structured and who should conduct it.

Technology will undoubtedly bring about a great many improvements in battle command and decision making. But, by understanding how staffs work and how decision making processes facilitate staff work, there may be ways to maximize the potential of the staff.

EVOLUTION OF A THEORY FOR STAFF DECISION MAKING

The commander and his staff are representative of a hierarchical team. A hierarchical team is a group of individuals in which the individuals are of unequal social standing. Individuals in hierarchical teams have varying levels of expertise and experience and exist to perform a decision making task. One important distinguishing characteristic of hierarchical teams is that hierarchical teams do not reach decisions by consensus. In hierarchical teams, decisions are made by one individual—the leader.[5] What theories predict the behavior within hierarchical teams?

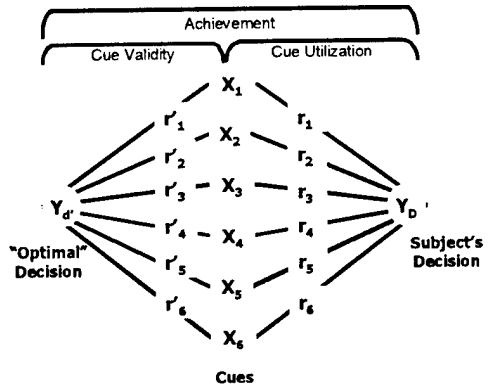
Brehmer and Hagafors' Early Paradigm

In 1986, two Swedish researchers, Berndt Brehmer and Roger Hagafors, found that even though group decision making was a very active area of psychological research, there was very little research to date of the special case of staff work and decision making in staffs. Staff work had no theory or pretheoretical framework to guide researchers, so they developed their own paradigm to guide the study of decision making in staffs.[6]

The paradigm developed by Brehmer and Hagafors is an adaptation of the lens model of decision making first developed by Brunswick.[7] The lens model is a regression approach to the study of decision making and judgement. Depicted in figure 1, the lens model allows the researcher to study and compare how a

subject weights an information cue when reaching a decision with the "optimal weighting" the environment gives to the same information cue towards the decision. The degree to which a subject's decision matches the optimal decision is referred to as the achievement index. By identifying quantifiable information cues, the researcher can measure the amount of variance in the subject's decision based upon an information cue.[8]

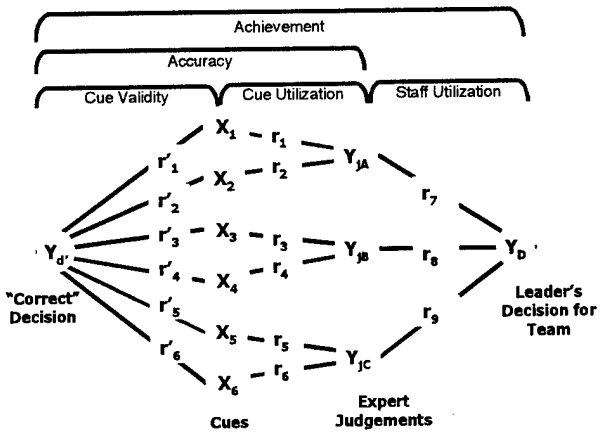
Figure 1. Brunswick's Lens Model[9]



However, as decision complexity increases the subject's achievement declines because of the cognitive limitations of humans. By dividing the cues along domains of expertise and allowing an expert to render a judgement on the cues within that domain, the decision maker can reduce the complexity of the decision to a manageable level and is able to maintain a higher achievement.

This being the essence of staff work, Brehmer and Hagafors then modified the lens model to reflect the participation of the staff in the decision process.

Figure 2. Brehmer and Hagafors's Model for Staff Work[10]



Using this model, graphically depicted in figure 2, Brehmer and Hagafors conducted experiments to analyze the effects on achievement caused by variations of cue validity or expert ability. They wanted to see if decision makers could properly weight the judgements rendered by the experts, and also see if the decision maker could learn to give different weights to the experts' judgements when the accuracy of their judgements differ—due to either differences in cue validity or cue utilization by the expert. Three conditions were studied: cues of equal validity and experts of equal ability, cues of unequal validity and experts of equal ability, and the final condition, cues of equal validity and experts of unequal ability.[11]

The observations from their experiments showed, in all three conditions, a strong dependency on the expert's judgement. In the condition of equal validity and equal ability, the decision makers weighted the judgements equally, as they should have. In the condition of unequal validity but equal ability, there was a small, but insufficient, decrease in the dependency on the affected judgement. Likewise, in the condition of equal validity but unequal ability, there was a small decrease in the dependency on the affected judgement. In the two latter cases, the decision makers recognized the difference in the inaccurate judgement but did not properly adjust for the inaccuracy. They over-weighted the inaccurate judgement, and there is no evidence that they accessed the information cues directly. This mis-weighting of the invalid judgements without directly accessing the information cues meant that the valid cues were under-weighted when the staff expert lacked competency, and that invalid cues were over-weighted at the expense of the valid cues when the judgement was affected by invalid cues. [12]

Due to the limitations of their experiments, they were only able to hypothesize reasons for the decrease in achievement when one judgement was inaccurate. They offered the following:

> "We may note that the subjects make appropriate differentiation among experts to some extent in all three conditions. Consequently, it may be that they rely on the experts in all three conditions but they fail to learn the differences among them perfectly. Their resulting cue utilization would then just be consequences of their utilization of the experts."[13]

Brehmer and Hagafors had achieved their intent. They had established a early paradigm. By building their paradigm based on a lens model, they were able to look at decision making from a performance perspective. But, their

paradigm was still limited and did not explain the various subordinate aspects of decision making in staff settings.

The Multilevel Theory of Team Decision Making

Brehmer and Hagafors's paradigm served as a useful basis for other researchers to expand upon. In 1995, John R. Hollenbeck, and others, from the Department of Management, Eli Broad Graduate School of Business, Michigan State University developed a multilevel theory for team decision making and team performance in decision making. Their theory predicts that decision making accuracy is determined by constructs that occur at one of four levels: the team-level, the dyadic level, the individual level, and the decision level. The core constructs capture the key processes that hierarchical teams need to manage to make accurate decisions.[14]

The lower level constructs occur at the decision and individual levels. At the decision-level, the decision object itself generates a set of cues of varying values. These cues are acted upon at the individual level by the staff members who render judgements on the cues. The leader interacts dyadically with the staff members to form a belief about the validity of each staff member's judgement. This belief, held by the leader, determines how that staff member's judgement is weighted by the leader towards the team's decision.[15]

They identify three core constructs, at the team-level, that are central to decision making accuracy in hierarchical teams. The three team-level core constructs are: team informity—the degree to which a team as a whole is apprised of all the relevant cue values associated with the decision; staff

validity—the degree to which the team as a whole has lower level members whose judgements are predictive of the decision object; hierarchical sensitivity—the degree that the team leader effectively weights the judgements of the staff when making the team's decision. According to their theory, management of these core constructs at the team-level is the key to staffs whose goals is improved decision making.[16]

Each team-level core construct is an aggregation of a corresponding lower level core construct. Team informity is an aggregation of decision informity—the extent to which an individual has the information pertaining to the decision. Staff validity is the aggregation of individual validity—the extent that an individual's judgements are predictive of the true state of the decision object. Hierarchical sensitivity, is the aggregation of dyadic sensitivity—the degree to which the team leader correctly weights the recommendation of an individual staff member.[17]

Hollenbeck et al. described non-core constructs as those variables seen as more distal causes of achievement that are mediated by the core constructs. Non-core constructs exist at all levels. Experience is an example of a non-core construct. Experience interacts with the core constructs in different ways. At some core constructs (individual validity, staff validity), experience has a significant direct impact on performance, whereas at other core constructs (decision informity, hierarchical sensitivity), its impact is less direct because it interacts with other non-core constructs to enhance performance.[18]

By the definition of this theory, there are causal relationships between the three core constructs at the team-level and achievement. The effects of a

variable on overall team decision accuracy are mediated through the relationships of the core constructs. The importance of identifying core versus non-core constructs is that it allows the analysis of team decision making by being able to detect the effects of variables that may have multiple but conflicting results on the accuracy of team decisions. The theory allows the researcher to study and measure the effects of different variables in leader-staff teams and to determine both where and how they affect achievement. Therefore it can be shown how a variable could have a dramatic impact on one core construct with no impact on decision accuracy because of how the other core constructs were or were not affected in their outcomes (e.g. a variable could increase team informity yet not increase staff validity, or a variable could have a negative effect on staff validity yet the variable could increase hierarchical sensitivity allowing the leader to correctly adjust for the lack of validity and still arrive at the optimal team decision).

Hollenbeck and his colleagues first published their multilevel theory of team decision making in 1995.[19] In June of 1998, they published the experimental results extending their theory to address the effects of feedback intervention, experience, and the relationship between the team-level core constructs and decision making accuracy. They proposed a number of hypotheses, outlined in table 1, and used their TIDE2 (Team Interactive Decision Exercise for Teams Incorporating Distributed Expertise) simulation to serve as a driver to create the decision making problems. [20]

Table 1. Hollenbeck et al.'s Experimental Hypotheses[21]

1A	Teams provided with process feedback on the core constructs of the multilevel theory of team decision making will perform better than teams that are only provided outcome feedback.
1B	The effect of process feedback on team performance will be mediated by the core constructs specified by the multilevel theory of team decision making.
2A	Experienced teams will perform better than inexperienced teams.
2B	The effect of experience on team performance will be mediated by the three core constructs specified by the multilevel theory of team decision making.
2C	The relationship between experience and positive team outcomes (such as decision accuracy and the core constructs) will be stronger in the absence of process feedback, which acts as a substitute for experience.
3A	There will be a positive relationship between team informity and staff validity.
3B	There will be a negative relationship between staff validity and hierarchical sensitivity.
3C	The relationship between team informity and staff validity will be stronger in the presence of process feedback.
3D	The relationship between staff validity and hierarchical sensitivity will be enhanced by experience.

Of the nine hypotheses proposed and tested, all were supported with empirical evidence except hypothesis 2C. Feedback was shown to be equally effective for both experienced and inexperienced teams as a means to increase achievement. Both experienced and inexperienced teams learn and improve their decision accuracy when presented with process feedback. [22]

Both non-core constructs of experience and feedback increase overall achievement. Experience has the greatest direct impact on individual and staff validity—knowing how to use the available information to make a judgement requires experience.

Feedback intervention had a major direct impact in two areas. First it had a direct impact on decision informity. When members of the team were presented with feedback alerting them that another team member lacked information to render a judgement, they were motivated to assist that member acquire the necessary information. Feedback was instrumental in ensuring that all members of the staff received the information they needed to make their judgements.

Feedback intervention enhanced the relationship between team informity and staff validity. In the core constructs where experience did not have a direct impact, it enhanced the relationship between team-level core constructs.[23]

But the second, and perhaps most significant, impact of feedback on team performance is the effect it has in the core construct of hierarchical sensitivity.

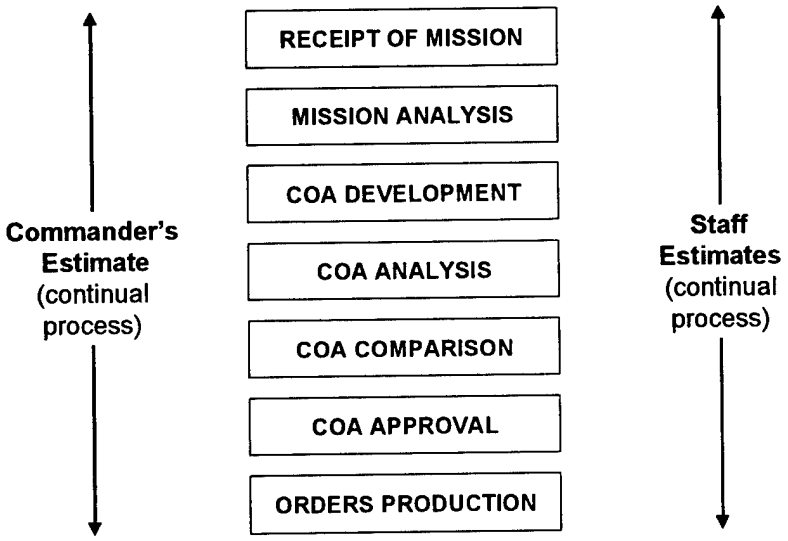
> "Although the feedback intervention had effects on all the core constructs, its main virtue was that it promoted hierarchical sensitivity. That is, the presence or absence of process feedback had a major impact on hierarchical sensitivity, which in turn had a major impact on over all team decision making accuracy [achievement]. This is an important finding because it was the one core construct that did not appear to simply improve with experience. ...Hierarchical sensitivity is the most complex of the core constructs, and identifying problems on this dimension is probably difficult for many teams. In lieu of any direct feedback, a leader and staff members probably have only a general idea of the relative value of each staff member or the weight being assigned to each staff member during real-time task engagement. This lack of information limits a team's ability to develop a highly accurate and differentiated weighting structure."[24]

Looking back at Brehmer and Hagafors's experiment, the difficulties associated with properly weighting a staff member's judgement that is inaccurate do not improve with experience alone. The ability to properly weight staff members' judgements improves with feedback. Hierarchical sensitivity is extremely complex, and Hollenbeck and his colleagues consider it one of the most difficult core constructs for a team to learn and to manage. The general tendency is for leaders to weight staff recommendations too heavily and too uniformly—which was also observed by Brehmer and Hagafors.[25] This tendency has to be unlearned through experience, but more importantly, it requires feedback to show the commander what the proper weighting should be. These experiments also showed that while experience may augment hierarchical sensitivity, feedback, had a direct significant impact on the team leader's ability to appropriately weight the judgements of staff members.[26]

If these core constructs can be managed and used to improve decision making performance in hierarchical staffs, then where are they found in an U.S. Army staff executing the military decision making process (MDMP)? Once the core constructs are identified in the MDMP, how can Hollenbeck et al.'s observations about feedback and experience be applied to the MDMP to improve the decision made by commanders utilizing a staff?

Battlefield visualization is an essential component of the U.S. Army's doctrinal concept of battle command. The commander must be able to visualize his current state, a desired end state, and the steps he and his unit must take to achieve the desired end state.[27] To reduce the complexity of the battlefield environment, the commander is assisted by his staff as he develops his battlefield visualization. The doctrinal process used by the staff to help the commander achieve his battlefield visualization is the MDMP.

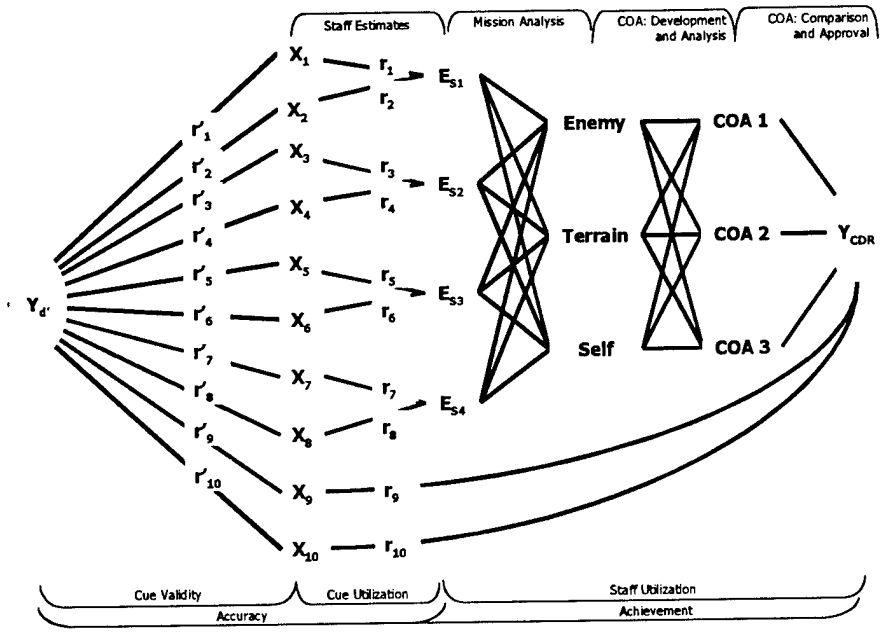
Figure 3. The Military Decision Making Process (MDMP)[28]



In order to utilize Hollenbeck, et al.'s theory, it is important to be able to identify where the core constructs are in the MDMP. At the decision-level the core construct of decision informity (the extent that the staff officer has the relevant information pertaining to his domain of expertise), exists with the information cues themselves. Gathering the relevant information is a part of the estimate process and although occurs continuously throughout the MDMP. At the individual-level individual validity is the ability of the staff officer to make accurate judgments that are predictive of the decision making environment. These first two core constructs actually exist outside of the six steps of the MDMP and exist in the staff estimates, which is a continual process of updating the information and the relevance of that information.

At the team-level, which is where the essential core constructs are according to Hollenbeck et al., team informity is the aggregate of decision informity, and it occurs in mission analysis. Mission analysis is where the staff brings in all their stove-piped information and aggregates it into one whole to describe the decision environment. The second core construct at the team-level is staff validity. It is the ability of the staff, collectively, to make a judgment which is predictive of the decision environment. Staff validity is found in the MDMP steps of developing, analyzing, selecting and recommending courses of action to the commander.

Figure 4. Developing Battlefield Visualization

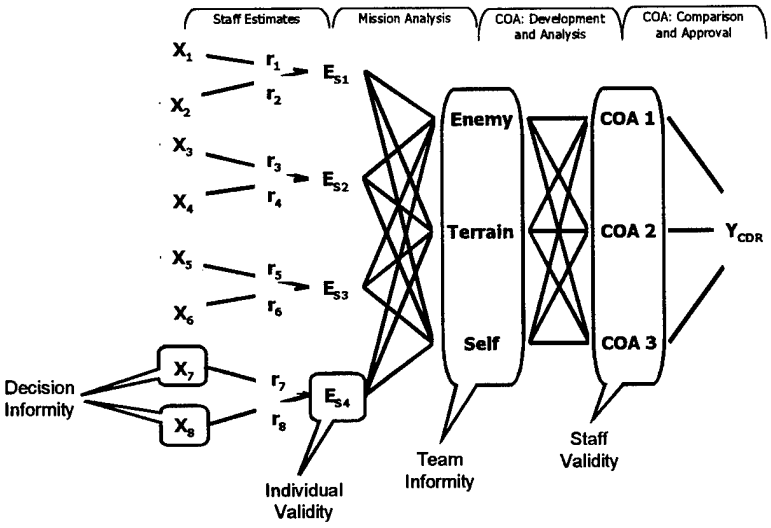


In figure 4, staff utilization of Brehmer and Hagafors's paradigm, is expanded to graphically show the aggregating processes of converting decision informity to team informity and individual validity to staff validity. In this example, the staff assembles the information from their respective domains into a visualization of the current state represented by the variables of see yourself, see the enemy, and see the terrain. The aggregation of the staff's individual judgements into a collective judgement depicting the actions necessary to achieve the desired future state is represented by the development of courses of action then selecting one of the courses of action to recommend to the commander. Decision making accuracy, the staff's achievement, is the degree to which the selected course of action, selected and implemented by the commander, is predictive of the end-state and the steps necessary to achieve that end state from the current state.

Also depicted in figure 4 are the information cues that the commander accesses directly. These cues consist of information regarding morale, abilities of subordinate commanders, and other information obtained through his personal reconnaissance. These cues may or may not be available to the staff, but are depicted here because they are a part of the decision making environment. Just as the staff is continuously updating their individual staff estimates, so is the commander. As General Franks comments:

> "How do you reconcile the battle commander's continuing running estimate—both present and future—as he moves about the battlefield, constantly asking questions, gaining information, probing to determine its accuracy, getting judgements from subordinates and doing synthesis with this information to form hypotheses in his own mind about what needs to be done, with the estimates and hypotheses the staff is working on at the CP?"[29]

Figure 5. Identification of Core Constructs



Having expanded staff utilization of the original paradigm to show where the steps of the MDMP fit into the paradigm; figure 5 labels four of the six core constructs, and graphically depicts where they fit into the MDMP. The other two

core constructs, dyadic sensitivity and hierarchical sensitivity, deal with the social interactions between the decision maker and the staff officers. How the decision maker weights their judgments individually, and how he aggregates those individual weightings into his overall weighting for the staff and are not depicted graphically because they occur within the commander during the actual decision.

One more adaptation needs to be made with respect to the depicted role of the commander. During deliberate decision making with the MDMP the commander's role is intermittent. His participation during mission analysis, and course of action approval is specified and he may or may not participate outside of those roles.[30] Since he may not be present during the aggregation processes of mission analysis and course of development the core constructs are affected by the staff officer leading and directing the efforts of the staff during these key processes.

From Hollenbeck et al.'s theory the greatest impact of feedback intervention is that it can help the individual staff officer improve his performance in identifying relevant information within his domain of expertise. Experience had its direct impact on individual validity and staff validity. Likewise, it can help the staff as it aggregates the information cues from across the various domains and forms them into the common visualization necessary to be achieved in mission analysis. It can also assist the commander to identify and correct how he weights input from the various staff officers as he makes his decision. Since feedback intervention has a direct impact on dyadic and hierarchical sensitivity the target of

that feedback is not restricted solely to the commander, but is also directed to the staff officer that directs the staff in the commander's absence.

With the knowledge of where the core constructs are, it now becomes necessary to examine how to manipulate the variables of feedback and experience or competence within this framework.

IMPROVING DECISION MAKING ACCURACY

If Hollenbeck et al.'s theory and observations are valid regarding the effect of the variables of feedback and experience on decision making accuracy, how does feedback modify human behavior? How can feedback be utilized to improve the performance of the staff individually as well as collectively. This section looks at a feedback intervention theory and the relationship between the task characteristics that an individual is asked to perform and their demonstrated level of competency.

Feedback Intervention and AARs

In 1996, Avraham N. Kluger, from the School of Business Administration, The Hebrew University of Jerusalem, and Angelo DeNisi, from the School of Management and Labor Relations, Rutgers University, published a historical review of feedback intervention research. Along with their review, they also provided a preliminary feedback intervention theory.[31]

Their feedback intervention theory has five aspects: behavior is regulated by comparisons of feedback to goals or standards, goals or standards are organized hierarchically, attention is limited and therefore only *feedback-standard gaps* that receive attention actively participate in behavior modification, attention is normally directed to a moderate level of the hierarchy, and feedback interventions change the focus of attention and therefore behavior. These five

components of their feedback intervention theory are interrelated and are built around three key concepts: a feedback-standard gap, a feedback hierarchy, and attention.[32]

Feedback-standard gaps exist when feedback on task performance differs from the standard or goal set for that task.[33] If the standard is higher than the performance, the gap has a negative sign, and if the performance is higher than the standard, then the gap has a positive sign. Regardless of the sign, if a feedback intervention is identified, the individual will react to the gap with one of four coping mechanisms. Two of the coping strategies involving changing one of the reasons for the gap —changing performance to meet the goal, or changing the goal to meet the performance. The other two mechanisms involve the elimination of the reasons for the gap—reject the feedback intervention, or abandon the goal.[34]

Kluger and DeNisi recognized that feedback-standard gap comparisons were too simplistic to stand alone as a theory, so they added to their theory the concept of hierarchies of feedback intervention. The hierarchies referred to have three levels of linked processes which regulate performance: the meta-task processes involving self, the task-motivation processes involving the task, and the task learning processes involving the details of the task.[35]

Like March, Kluger and DeNisi's theory recognizes the constraint on attention by noting that only those feedback-standard gaps that receive attention will result in behavior modification. This allocation of attention to the feedback-standard gap will cause a corresponding shift in attention in the individual at one of the

hierarchical levels. Their research shows that if the feedback intervention focuses attention at the meta-task level, the effect of feedback is attenuated—both praise and chastisement were shown to have debilitating effects on performance. The reason for the attenuation is that the interaction at the meta-task level shifts the allocation of attention from task performance to the higher realms of self.

Their second proposition explains the effects of feedback interventions directed at the task-motivation and task-learning levels of the hierarchy.

> "Feedback interventions effects on performance are augmented by (a) cues that direct attention to task-motivation processes and (b) cues that direct attention to task-learning processes coupled with information regarding erroneous hypotheses."[36]

Feedback directed towards experts should be focussed at either the task motivation or the task learning level in the hierarchy. If the feedback intervention is directed at the task learning level, how should that feedback be constructed to improve the performance of the individual staff member? When the feedback is either directed at the task-learning level, or has an effect at the task-learning level of the hierarchy, it needs to also include cues which will help the expert reject wrong hypotheses for task learning or task design.

Recall that one of the cognitive limitations identified by James March was problems of attention—time and capabilities are limited and too many signals are being received to process with mental resources of an individual.[37] According to Kleuger and DeNisi people's attention is normally focussed at the moderate hierarchy, towards task motivation. If a performance-standard gap exists, behavior modifications to reduce the gap will not occur unless some feedback

focuses the attention on the performance-standard gap. If the feedback is directed at the moderate level of hierarchy or task motivation level, then the response will most likely be directed towards increasing motivation to accomplish the task or shifting the focus of attention towards learning the task to increase performance. If the feedback shifts from the task motivation to the meta-task level of the hierarchy, it will have a debilitating effect on performance because it shifts the attention from the task to the feedback recipient's sense of self-worth. If the focus of the feedback intervention causes attention to shift from the task motivation to the task learning level then it must also be accompanied with cues to help reject erroneous hypotheses for task completion. As the next section shows, the characteristics of the task the expert is required to perform, will determine the extent of competency within the expert, or in this example, the competency of the staff officer.

Competency and Task Characteristics

The definition of an expert with respect to decision making is relatively standard throughout the literature: experts are able to apply their expertise and judgement to a given set of cues more effectively than non-experts. Extending this to predictive environments, the validity of a non-expert's predictive judgement from a given set of cues will be relatively consistent with chance, while the accuracy of an expert's predictions will be greater than what could have been generated by chance or guessing.

In 1992, writing the introductory article for a special issue of *Organizational Behavior and Human Decision Making Processes* devoted to the study of

experts, James Shanteau, of Kansas State University, and Thomas R. Stewart, of the University of Albany, defined experts as follows:

> "According to Webster (1979), an expert is someone 'displaying special skill or knowledge derived from training or experience.' This is consistent with our view that expert judgement applies in situations where there are grounds for saying that some judgements are better than others..."[38]

"Expertise, to be of practical use, should be measurable as improved performance over forecasts or diagnosis given by those people or systems thought of as 'inexpert'." [39] This performance approach to expertise, as described by Fergus Bolger and George Wright of Bristol Business School, UK, is what this paper uses—that an expert's expertise is measurable as improved performance in predictive judgements when compared to the predictive judgements of non-experts or novices. With respect to the lens model, the achievement for a novice would be indistinguishable from chance, whereas the expert should be able to analyze the information cues from the decision making environment and make a predictive judgement with greater accuracy than what the laws of probability would allow for mere guessing.

Shanteau provides five factors—domain knowledge, psychological traits, cognitive skills, decision strategies, and task characteristics—which influence the emergence of expertise. Shanteau's fifth factor, task characteristics, highlights his finding that the tasks experts do influence the manifestation of their expertise. Shanteau states that it is the task characteristics that determine whether it is even possible for experts to act competently. Even with the appropriate knowledge, traits, skills, and strategies, experts may perform with no greater

competence than novices, if the characteristics of the task do not support expert performance.[40]

Shanteau analyzed domains where experts perform well and domains where experts perform poorly. Shanteau noted that the domains with expert performance involved making decisions about static objects or things, that the stimuli involved were relatively constant, whereas domains with poor expert performance involved dynamic stimuli—most notably, human behavior.[41]

The task characteristics Shanteau identifies as being important to allow the demonstration of expertise are: static stimuli, decisions about things, experts agree on stimuli, more predictable problems, some errors expected, repetitive tasks, feedback available, objective analysis available, and the problem is decomposable. From these characteristics he proposes three hypotheses, two of which are of particular interest to the present study. The more a task contains these characteristics, the greater the competence that will be seen in an expert. Expertise can be improved in domains not noted for demonstrating good predictive judgements if the tasks can be constructed to include these characteristics.[42]

Bolger and Wright identify three factors which influence the ability to learn or gain expertise. First, the availability of accurate, relevant and objective data and/or domain models upon which decisions can be based. Second, the possibility of expressing judgements in a coherent, quantifiable, and potentially verifiable manner. Third, the existence of rapid and meaningful feedback about the accuracy of judgements. Of these three factors, the most important factor is

meaningful feedback "...as we have already suggested, without usable feedback the decision maker is unable to improve on his or her own judgmental performance."[43]

The army has within its training doctrine a process already developed on how to provide feedback. This process is known as the After Action Review (AAR). During an AAR members of the organization participate in a professional discussion and learn for themselves what happened, why it happened, and ways to improve future performance. The performance standard gaps are identified by comparing the intended outcomes of the process with the actual outcomes of the process. The emphasis in a training environment is on discovery learning within the AAR process. Because of the participative nature of the process, participants have a greater ownership in its outcomes. AARs are resource intensive and require detailed planning.[44]

Decision making in a time constrained environment for extended periods may not have the resource of time to be able to fully execute an AAR in accordance with army training doctrine. The amount of discovery learning may need to be abbreviated in order to bring attention to specific performance standard gaps. Feedback provided at the task learning hierarchy will need to be more prescriptive than might normally be encountered in a training environment.

ANALYSIS OF COMBAT TRAINING CENTER TRENDS

The following observations were published by the US Army's Center for Army Lessons Learned (CALL) in their publications priority trends for both the National Training Center (NTC) and the Joint Readiness Training Center (JRTC). The trends were derived from quarterly observer/controller derived observations submitted to CALL. These observations were reported as trends because they had been repeated on numerous occasions.

The focus on selecting trends in this analysis is on the decision making/planning process and not on decision making during the execution and conduct of operations. The specific trends were selected because in the observations they either depicted a cause and effect relationship, or provided enough information to infer such a relationship. The analysis consists of identifying from the observation which core constructs are affected and specifically looks at what level of the hierarchy the feedback intervention should be directed to improve performance within the staffs.

NTC Trends

Problem: Units are not conducting Class V estimates to determine their required supply rate (RSR), then comparing it to their controlled supply rate (CSR) and schedule of fires to plan resupply operations based on priorities and resupply triggers.

1. Battalion leaders and CSS planners are not conducting accurate inventories of Class V on hand, tracking munitions available for draw, and managing ammo haulers by bumper number.
2. The battalion FDO is not being consulted on the schedule of fires or expected expenditures.

3. CSS planners are not associating specific support requirements for the battalions critical fire support tasks.
Result: The realization that units are not correctly resourced or are not being considered for resupply comes too late to rearm without mission interruption.[45]

Analyzing the above trend from the NTC at the decision level, decision informity is diminished due to missing the information cues of: class V inventory, munitions available for draw, location and utilization of ammunition haulers, CSR, critical fire support tasks and schedule of fires. At the individual level the S4, supported by other CSS elements, of the battalion does not organize or analyze the information cues. Consequently, the S4 does not present a valid judgment to the commander based on the information available. The availability and relevancy of the information is not in question and it appears the reason for the degraded individual validity is due to the abilities of the S4. Team informity is affected because the missing information cues which identify units as not being resourced is not presented to the entire staff to be aggregated into the shared understanding of the current state. Therefore, the staff validity in recommending a course of action is also degraded because they recommended a course of action predicting a future state where the unit had sufficient class V on hand. In fact, the unit mission was interrupted due to ammunition exhaustion. It should be noted that one of the information cues, schedule of fires, is actually a by-product of the COA development process thus highlighting the fact that individual staff estimates are continuously being updated during the MDMP process.

The feedback intervention for this problem would be directed towards specifying how the S4 and other CSS staff planners should maintain visibility of current logistical readiness. At the team level the feedback intervention should

be directed towards ensuring that the FDO gives the schedule of fires information to the CSS planners for incorporation to their estimates.

> The Forward Support Battalion (FSB) medical company commander is often unable to participate in the orders process because of operational responsibilities; the FSB support operations officer normally lacks the experience in medical operations.
> Result: Medical operations are not being properly synchronized into the overall operations. [46]

In this observation the problem lies with the inexperience of the FSB support operations officer's ability to make judgments on medical operations. However, the information cues are still present. Feedback even to the inexperienced FSB officer directed specifically to the task learning level identifying precisely the information which is relevant for medical operations would increase both decision informity as well as team informity. Although the FSB support operations officer lacks experience in his judgments, with respect to medical operations, repeated feedback at the task level identifying how to make judgments in this domain would help shape the specific tasks he is required to perform. This would enhance the validity of his judgment into the staff's overall validity in selection of a course of action.

> Problem: Fire support integration during the wargame is still not to standard.
> 1. Fire support integration during wargaming of branch plans is usually not done.
> 2. The S-3 usually focuses strictly on maneuver.
> 3. Fire Support Officers (FSOs) and Air Liaison Officers (ALOs) are expected to participate in the wargame *only as observers.*
> 4. Integration of radar zones with the maneuver plan is forgotten.
> 5. Integration of mortar priority targets and mortar positioning is seldom accomplished.
> 6. Integration of the reconnaissance and surveillance plan with the fire support plan is never done.
> 7. Prioritizing or focusing fires for different phases of the operation is not done.
> 8. Integrating CAS targets into the plan is not done.
> Result: The lack of fire support integration into the wargaming process leads to a disjointed use of fire support assets with an end result being a loss in ability to mass on the enemy and an overall inability to protect the force.[47]

At the decision level, the information cues affecting decision informity are CAS targets, mortar priority targets and mortar positioning and radar zones. Team informity and staff validity are also degraded because the S3 has weighted maneuver operations too heavily at the expense of not incorporating the judgments and information of the fire support officers, air liaison officers, nor has he integrated the reconnaissance and surveillance plan with the fire support plan. The aggregation of the other staff judgments is missing. Here is an instance where the dyadic and hierarchical sensitivity of the S3 would benefit from feedback showing the proper weighting of other battlefield operating systems into the recommended course of action, since it can be inferred that he is leading the staff's effort in the absence of the commander.

According to Hollenbeck, a commander knowing that his staff's recommendation is biased can adjust for that bias in his weighting of his staff's recommendations. However doing so in a tactical environment such as depicted in the situation above would require costly delays in time since debiasing the staff's recommendation would require the development of a course of action with the bias removed. This technique is impractical during continuous tactical operations. Therefore, feedback intervention should be directed in this case towards the S3's dyadic and hierarchical sensitivity, identifying his excessive weighting of maneuver at the expense of fires and other BOSs in the course of action, to avoid presenting biased recommendations to the commander in the course of action. Additionally, the feedback intervention would also be directed

towards the staff in techniques of aggregating all the information from the various domains into a common visualization of both the current and future state.

> Too many task force commanders go through the tactical decision making process (TDMP), then into battle without knowing what fire support assets are available to support their missions. Fire Support Officers (FSOs) and Air Liaison Officers (ALOs) *do not identify critical information*, usually provided by brigade, such as specified and implied tasks, as well as assets available.[48]

In this observation the staff has not presented to the commander a clear visualization of his current state and the capabilities available to him to reach his desired end state. At the decision level the information cues are fire support assets, close support assets, specified and implied tasks and other fire support information supplied to the task force from the brigade. Staff validity, with respect to fires, is degraded because the information cues were not incorporated into team informity nor were the individual estimates correctly aggregated into the staff's recommendation. Feedback in this situation would be directed towards acquiring and aggregating the information cues with respect to fire support and close air support into the decision making process.

JRTC Trends

> Problem: Staffs rarely update the estimates they prepare at Home Station.
> Results:
> 1. Incomplete picture of the capabilities and limitations of each battlefield operating system during the decision making process.
> 2. Unsound decisions on task organization, missions, and tasks and purposes.[49]

In this observation, the staff made assumptions from the information cues available back at home station. By not updating their original staff estimates with new information as the situation evolved. Decision informity is diminished with

ripple effect throughout the other core constructs. With invalid information the individual validity of the respective staff estimates is reduced. Team informity likewise is reduced as is staff validity. Feedback intervention in the scenario would be directed at the task motivation level motivating the staff officers towards executing and keeping their staff estimates current throughout the operation. Likewise feedback intervention to the commander should be directed towards identifying invalid staff recommendations.

This observation puts a slight twist into the findings of Brehmer and Hagafors who observed that a decision maker would differentiate an invalid judgment amongst valid judgments. However, they did not treat the case of the ability of a decision maker to recognize invalid judgments when there are no valid judgments to compare them against. In this instance the commander did not recognize the diminished validity of his staff's judgments.

> Problem: During the brigade planning process, most units do not report realistic casualty or battle damage assessments. Some units do not complete the assessments at all.
>
> Results:
>
> 1. Poor assessments contribute to commander's inaccurate delineation of available combat power.
> 2. Medical assets cannot be arrayed to support medical evacuation.[50]

In this observation, the commander's visualization of his future state is degraded by invalid staff judgment. Since battle damage assessment is subjective and requires experience in order to be valid, the feedback should be process feedback with a specific technique to make battle damage assessments during course of action analysis so that the staff will not pursue invalid techniques in trying to learn a task in which it has no experience. Even if the assessments are invalid by a constant bias within the technique given to the

staff, the commander with his experience should be able to recognize the bias and debias the recommendation as he makes his decision. However, it must be cautioned that this debiasing effort may result in a significant change to the course of action requiring time not available to the staff.

Problem:

1. Task force CSS elements frequently make no effort to conduct formal or informal logistics, casualty, or personnel estimates.
2. Units conduct the planning process with no consideration of the current maintenance posture or projected combat power in the next six, twelve, or twenty-four hours.
3. Units do not balance anticipated casualties against their available evacuation resources, do not estimate casualty densities, or identify likely casualty zones.

Results:

1. CSS units are unable to identify key logistical shortcomings and tactical resupply requirements, or consider how to resolve these shortcomings.
2. Units enter the COA development and wargaming process with a distorted view of potential combat power.
3. Shortcomings in MEDEVAC capabilities are not identified.
4. Requirements for positioning and command and control of nonstandard MEDEVAC assets are not identified.
5. Soldiers die of wounds who could otherwise have been saved.[51]

In this observation, the lower level core constructs of decision informity and individual validity with respect to the CSS are reduced tremendously. This affects team informity and staff validity because the staff's recommendation does not have integration of CSS into the overall plan. The commander's visualization of his current state and future state with respect to CSS is distorted. Feedback intervention should be directed at the task motivation or the task learning level.

Problem: Task force integration of CSS into the Military Decision-Making Process (MDMP). Task force planning cells and chain of command display an indifference to CSS integration and do not supervise the BOS, resulting in a lack of integration among the CSS staff and their products.

1. The S4 is not fully integrated in the planning process at the task force level. While the S4 is present at times for mission analysis, he is not fully integrated into any formal process and in effect is not part of the battle staff.
2. The S4 and other CSS players are not included in COA development or the wargaming process.
3. The S4 often conducts his own CSS mission analysis at a separate location (CTCP) and includes only some key CSS players in this process.
4. The S4 writes an OPORD Paragraph 4 and issues this in the task force orders process. However, there is no identification of who has ownership for the CSS

players (support platoon, medical platoon, BMO, chaplain, S1) and who is responsible for delivering these key players an OPORD. The trend is that the S4 does *not* take ownership of these players and does *not* give an OPORD to the CSS players.

5. CSS rehearsals are hit or miss and not an institutional part of task force operations, and when they are conducted, they are not to standard.

6. CSS annexes are not produced.

7. CSS graphics continue to be inadequate and are incomplete. Graphics do not include main and alternate routes (MSRs and ASRs), dirty routes, decontamination points, aid stations, maintenance collection points, graves registration points, casualty collection points, etc.

Results:

1. Lack of integration results in an obvious disconnect between the battle staff and the CSS side of the planning process. Ultimately, this disconnect results in a CSS plan that does not effectively support the task force scheme of maneuver.

2. CSS sub-elements are left to fend for themselves, are not read in on the plan, and do not have adequate situational awareness to be effective.[52]

Staff validity and overall decision accuracy in this situation is degraded with respect to CSS. The S4 exclusion from mission analysis results in an overall decrease in team informity. The S4's exclusion from COA development and analysis reduces staff validity. This constant bias in the absence of CSS has not been identified by the commander. Consequently, overall decision accuracy has been degraded. Feedback interventions should be directed at task motivation to motivate the S4 and the rest of the battle staff to incorporate CSS information and judgments into the mission analysis and recommended course of action.

Summary of Analysis

Almost all the observations and trends reflected instances of missing processes rather than erroneous judgments being rendered. Not surprisingly, with the experience level of officers normally found in battalion staffs, which are the primary training audience for the NTC and the JRTC, the majority of the feedback analysis was directed at the task learning and the task motivation level. Feedback interventions which identify the correct task in a prescriptive manner,

according to Kluger and DeNisi, would be the most effective. It needs to be prescriptive because in a time constrained environment the staff cannot afford to pursue invalid task strategies. By being prescriptive, feedback intervention helps define and refine the characteristics of the task the staff officer is expected to perform. By keeping the task characteristics in line with those identified by Shanteau, the staff officer's performance will be enhanced as they continue to gain experience. The commander's visualization of his current state will increase because the staff will become more effective at producing a clear understanding of the battlefield environment. Having identified the benefits of a feedback intervention and also having an understanding of how those interventions interact in the decision making process it's important to identify how a staff can integrate this process into the current MDMP. Who provides the feedback? How is it provided? Where does the data come from? And where in the MDMP cycle is the feedback provided?

MODIFYING THE MDMP

The past few chapters have dealt with the use of feedback targeted at specific decision making constructs inside the staff which according to Hollenbeck et al.'s theory and experimental observations improve decision making accuracy. The analysis of the trends from the NTC and JRTC indicate that problems staffs are experiencing are in areas which according to Hollenbeck et al.'s theory would benefit from process feedback. The use of feedback in the form of after action reviews (AARs) is an important aspect of U.S. Army training. The importance of providing quality feedback leads to extensive instrumentation of the combat training centers to enhance their ability to provide training units quality AARs about their performance. The assertion of this paper is that the use of AARs to improve performance should not be limited exclusively to the training environment.

How should an AAR be incorporated as one of the steps of the MDMP? Where should the AAR occur so that it can be executed during the normal battle rhythm especially during continuous battle operations and who should conduct it? Key aspects to be addressed are what should the feedback consist of and where to gather the information for the feedback.

Recall that the feedback intervention theory proposed by Kluger and DeNisi states that in order for feedback intervention at the task learning level to be

effective, it must be prescriptive in order to prevent the recipient from exploring ineffective strategies. This component of feedback differs from an AAR where the recipients of the feedback conduct discovery learning of the correct strategies to pursue. Recall from Klueger and DeNisi, that performance standard gaps will only be corrected if attention is drawn to them. Under the time constraints of continuous operations, it may only be practical to provide feedback on one or two key aspects where the performance standard gap is most critical.

Should the commander as the individual overall responsible for both the decision and the performance of the staff conduct the AAR? Since his battlefield visualization is what the staff is trying to assist, this would be the best choice. However, the demands on the commander's time could make this an impractical solution. Nevertheless, if the staff is having great difficulty in assisting the commander develop his battlefield visualization, then this may be the most effective method to overcome that difficulty. In the absence of the commander, the person responsible for directing the activities of the staff during planning, whether it be the chief of staff, executive officer, or the operations officer if this has been delegated, should then conduct this AAR. Feedback pertaining to the hierarchical sensitivity of the staff leader in either case should come from the commander.

With inexperienced staffs similar to those analyzed during the paper the majority of the feedback should be directed at the task learning level with reliance on doctrinal publications to specify how the task should be accomplished. In the

absence of a clear doctrinal technique or procedure, feedback should rely on the standard operating procedure to specify how the task is to be performed.

With inexperienced staffs, as was noted in some of the trends analyzed earlier, some of the feedback will need to be oriented at the task motivation level. In several instances the observation was not that the task was performed poorly but that the staff had performed the task earlier and had failed to perform the task again with the updated information. A key component of process feedback in a time constrained environment is to include feedback pertaining to the time constraint maintaining the task performance in the context of the available time. Additionally, as staffs become more experienced and perform well-established procedures within the time constraints and become more adept at aggregating their individual estimates during mission analysis and course of action development then the feedback will begin to shift from purely process feedback to outcome feedback.

Whereas team informity was directly impacted with process feedback outcome feedback will enhance the experience level of the staff members and enhance staff validity. In order to be effective, outcome based feedback must capture the judgment supporting reasoning for the predictive judgment of the staff at the time the judgment was made. Once the predicted event has transpired the outcome can then be compared to the prediction. Key to this type of feedback is to avoid hindsight bias and representativeness. Even if the predictive judgment was accurate, the staff needs to examine contradictory evidence and analyze ways that the outcome may have occurred differently.

This type of feedback would involve a greater amount of discovery learning and most probably would not result in immediate results.

The time to introduce this feedback to the staff should be after orders production or during mission receipt. Conducting it as a part of mission analysis would attenuate the effectiveness because the new tasks strategies would not be able to be implemented until a subsequent iteration of the MDMP. An additional benefit of feedback intervention during the actual staff planning process is that it would prevent the phenomena of social loafing. Since every staff officer would know his contributions could be made public, this type of pressure has been shown to motivate participants to maintain the relevancy of their contributions.

CONCLUSION

This monograph presented the development of the theory for the improvement of staff decision making. By managing the core constructs, the decision making accuracy of a staff can be improved especially through the use of feedback. The use of feedback to improve performance and to help staff officers define the task which they are required to perform was also developed. Trends from the NTC and the JRTC were analyzed to identify which core constructs were most affected, and examples of how the feedback should be constructed were presented for each trend.

A short modified AAR should be included in the MDMP following orders production to provide feedback to the staff on their performance to improve decision making accuracy. Feedback should be targeted at motivating the officers to perform specific tasks during the planning processes. If the tasks are currently being done poorly, then the feedback should be prescriptive in how the task should be performed. After action reviews have long been a critical part of improving units during training and extending their use into the planning process would improve the performance of the staff.

NOTES

[1] James G. March, *A Primer on Decision Making: How Decisions Happen*, with the assistance of Chip Heath, (New York: The Free Press, 1994), 10.

[2] Paul Slovic and Sarah Lichtenstein, "Comparison of Bayesian and Regression Approaches to the Study of Information Processing in Judgement," *Organizational Behavior and Human Performance* 6 (1971) 652.

[3] Thomas R. Stewart et al., "Effects of Improved Information on the Components of Skill in Weather Forecasting," *Organizational Behavior and Human Decision Processes* 53 (1992) 107-134.

[4] Kenneth A. Graetz et al., "Information Sharing in Face-to-Face, Teleconferencing, and Electronic Chat Groups," *Small Group Research* 29 (1998) 714.

[5] John R. Hollenbeck et al., "Multilevel Theory of Team Decision Making: Decision Performance in Teams Incorporating Distributed Expertise," *Journal of Applied Psychology* 80 (1995) 292-316.

[6] Berndt Brehmer and Roger Hagafors, "Use of Experts in Complex Decision Making: A Paradigm for the Study of Staff Work," *Organizational Behavior and Human Decision Processes* 38 (1986) 181-195.

[7] Egon Brunswick, "Representative design and Probabilistic Theory in a Functional Psychology," *Psychological Review* 62 (1955) 193-217.

[8] Slovic and Lichtenstein, 654-655.

[9] Ibid., 656.

[10] Brehmer and Hagafors, 183.

[11] Ibid., . The experimental task was a fictitious six-cue medical task. The six cues were divided between three domains of knowledge. Three experts would render judgements on the cues in their respective domains and present their judgements to the decision maker. The decision maker would then make a decision on the severity of the patients illness. The experiment was designed so that they could vary the validity of the information cues or they could vary the abilities of the experts.

[12] Ibid., 191-192.

[13] Ibid., 193.

[14] Hollenbeck et al., Multilevel Theory, 270-271.

[15] Hollenbeck et al., Multilevel Theory, 296.

[16] John R. Hollenbeck et al., "Extending the Multilevel Theory of Team Decision Making: Effects of Feedback and Experience in Hierarchical Teams," *Academy of Management Journal* 41 (1998) 269-282.

[17] Hollenbeck et al., Multilevel Theory, 292-316

[18] Ibid., Idem "Extending the Multilevel Theory", 299.

[19] Hollenbeck et al., Multilevel Theory, 292-316

[20] Ibid., Idem "Extending the Multilevel Theory", 269-282.

[21] Ibid., 269-282.

[22] Ibid., 277

[23] Ibid.

[24] Ibid.

[25] Brehmer and Hagafors, 191.

[26] Hollenbeck et al., "Extending the Multilevel Theory," .

[27] Headquarters, Department of the Army, *FM 100-15: Corps Operations*, (Washington, D.C.: GPO, 1997) 2-1.

[28] Headquarters, Department of the Army, *FM 101-5: Staff Organization and Operations*, (Washington, D.C.: GPO, 1997) 5-2.

[29]Frederick M. Franks Jr., "Battle Command: A Commander's Perspective," *Military Review* 76 (1996) 4-25.

[30] *FM 101-5,* 5-2.

[31] Avraham N. Kluger and Angelo DeNisi, "The Effects of Feedback Interventions on Performance: A Historical Review, a Meta-Analysis, and a Preliminary Feedback Intervention Theory," *Psychological Bulletin* 119 (1996) 254-284.

[32] Ibid., 254-284.

[33] e.g. a soldier's goal is to score 270 points on the physical fitness test, and on his last test he scored 250 points.

[34] Ibid., 260. Using the earlier example of a soldier's performance on the physical fitness test, with a feedback standard gap of negative twenty points, the soldier can increase his performance, reduce his goal, reject the score as being flawed, (the sergeant was picking on me and didn't count several of my pushups), or the soldier can decide that high scores on the physical fitness tests are unimportant.

[35] Kluger and DeNisi, 254-284.

[36] Ibid., 268.

[37] March, 10.

[38] James Shanteau and Thomas R. Stewart, "Why Study Expert Decision Making? Some Historical Perspectives and Comments," *Organization Behavior and Human Decision Processes* 53 (1992): 95.

[39] Fergus Bolger and George Wright, "Assessing the Quality of Expert Judgement: Issues and Analysis," *Decision Support Systems*, 11 (1994) 2.

[40] Shanteau and Stewart,

[41] Ibid.256-259,

[42] Ibid.,

[43] Bolger and Wright, 2.

[44] Headquarters, Department of the Army, *TC 25-20, A Leader's Guide to After-Action Reviews*, (Washington, D.C.: GPO, 1993) 1-1.

[45] Center for Army Lessons Learned (CALL), U.S. Army Training and Doctrine Command (TRADOC), *NTC Priority Trends: A Compendium of Trends, with Techniques and Procedures that Work! 4QFY94 through 2QFY96*, (Fort Leavenworth, KS: GPO, n.d.) N-27.

[46] Ibid., N-38.

[47] Ibid., N-42.

[48] Ibid., N-48.

[49] Center for Army Lessons Learned (CALL), U.S. Army Training and Doctrine Command (TRADOC), *JRTC Priority Trends: A Compendium of Trends, with Techniques and Procedures that Work! 4QFY94 through 3QFY96*, (Fort Leavenworth, KS: GPO, n.d.) N-88.

[50] Center for Army Lessons Learned (CALL), U.S. Army Training and Doctrine Command (TRADOC), *CTC Trends: National Training Center (NTC): 1QFY98 and 2QFY98, with Techniques and Procedures that Work!* No. 98-14, (Fort Leavenworth, KS: GPO, 1998) 59.

[51] Ibid., 61.

[52] Ibid., 63.

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